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Seven new species of the Boarmiini (Geometridae, Ennominae) from Mindanao Is., the Philippines

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Abstract Seven new species of the Boarmiini are described from Mindanao Island, the Philippines.

Key words Lepidoptera, Geometridae, Ennominae, Boarmiini, new species, Mindanao.

In this paper one species of *Chorodna* Walker, two species of *Ectropis* Hübner and four species of *Alcis* Curtis are described as new to science. All of them were taken from Mindanao Island in the Philippines, and are so far endemic to that Island. This study is supported in part by the Grants-in-Aid for Overseas Scientific Research Nos 60041078 and 61043074 from the Ministry of Education, Science and Culture, Japan.

The following abbreviations are used to indicate the location of specimens. BMNH: The Natural History Museum, London. NSMT: National Science Museum, Tokyo. ZFMK: Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn. RS: R. Sato collection, Niigata.

Chorodna mindanensis sp. nov. (Fig. 1)

Male. Very similar to *C. complicataria* (Walker), but different from it as follows. Smaller in size: length of forewing 32 mm, while in *complicataria* 34-38 mm. Outer margin of hindwing more dentate. Discocellular spot of forewing not so elongate. Female unknown.

Male genitalia (Fig. 24). Similar to those of *complicataria*. Subbasal hairy lobe of costa larger and subapical setose projection from ventral margin of costa much more slender than in *complicataria*. Sacculus smaller and more slender, not curved ventrally as in *complicataria*, but almost parallel-sided. No projection between costa and sacculus, while in *complicataria* a slender projection is developed near sacculus. Aedeagus tapered towards rounded apex, while in *complicataria* it is weakly sclerotized apically in the shape of spatula.

Holotype. ♂, Philippines, Mindanao, Davao, Upper Baracatan, Apo Range, Mt Talomo 1,100 m, 3-6. viii. 1985, leg. M. Owada, NSMT. Paratypes. 1 ♂, same data as holotype, NSMT; 1 ♂, Bukidnon, Mt Binansilang 1,200 m, 45 km NW Maramag, 7°55'N, 124°40'E, 18. x. 1988, leg. K. Cerny & A. Schintlmeister, ZFMK.

C. complicataria was described from Borneo by Walker (1860: 493) as a member of the genus *Orsonoba* Walker. Later it was redescribed with the colour photograph under the genus *Chorodna* Walker by Barlow (1982: 131, pl. 45, fig. 1). Holloway (1993: 201) briefly redescribed it again with the colour photograph of the moth and illustrated the male genitalia (pl. 11, fig. 426). *Complicataria* is widely distributed from Peninsular Malaysia to Sundaland, but *mindanensis* has not been taken from any other regions than Mindanao. Semper (1901: 611) recorded *complicataria* from Luzon, the Philippines, but I have not yet examined his material by myself.

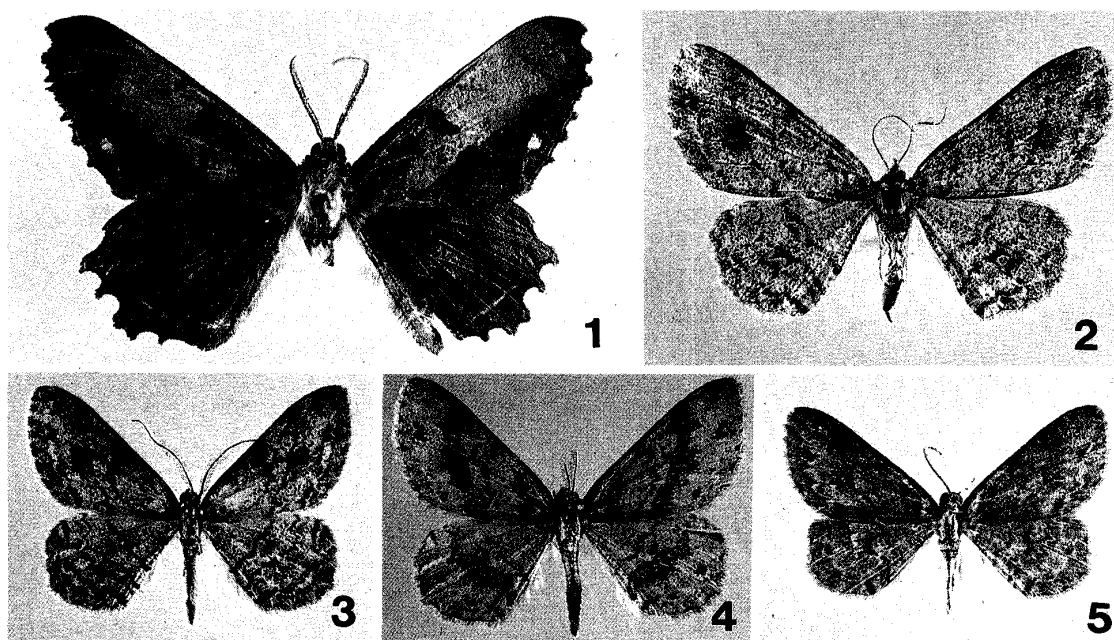


Fig. 1. *Chorodna mindanensis* sp. n., ♂.

Figs 2-5. *Ectropis* spp. 2-4. *E. pectinata* sp. n. (2. ♀ ; 3-4. ♂). 5. *E. cernyi* sp. n., ♂.

***Ectropis pectinata* sp. nov.** (Figs 2-4)

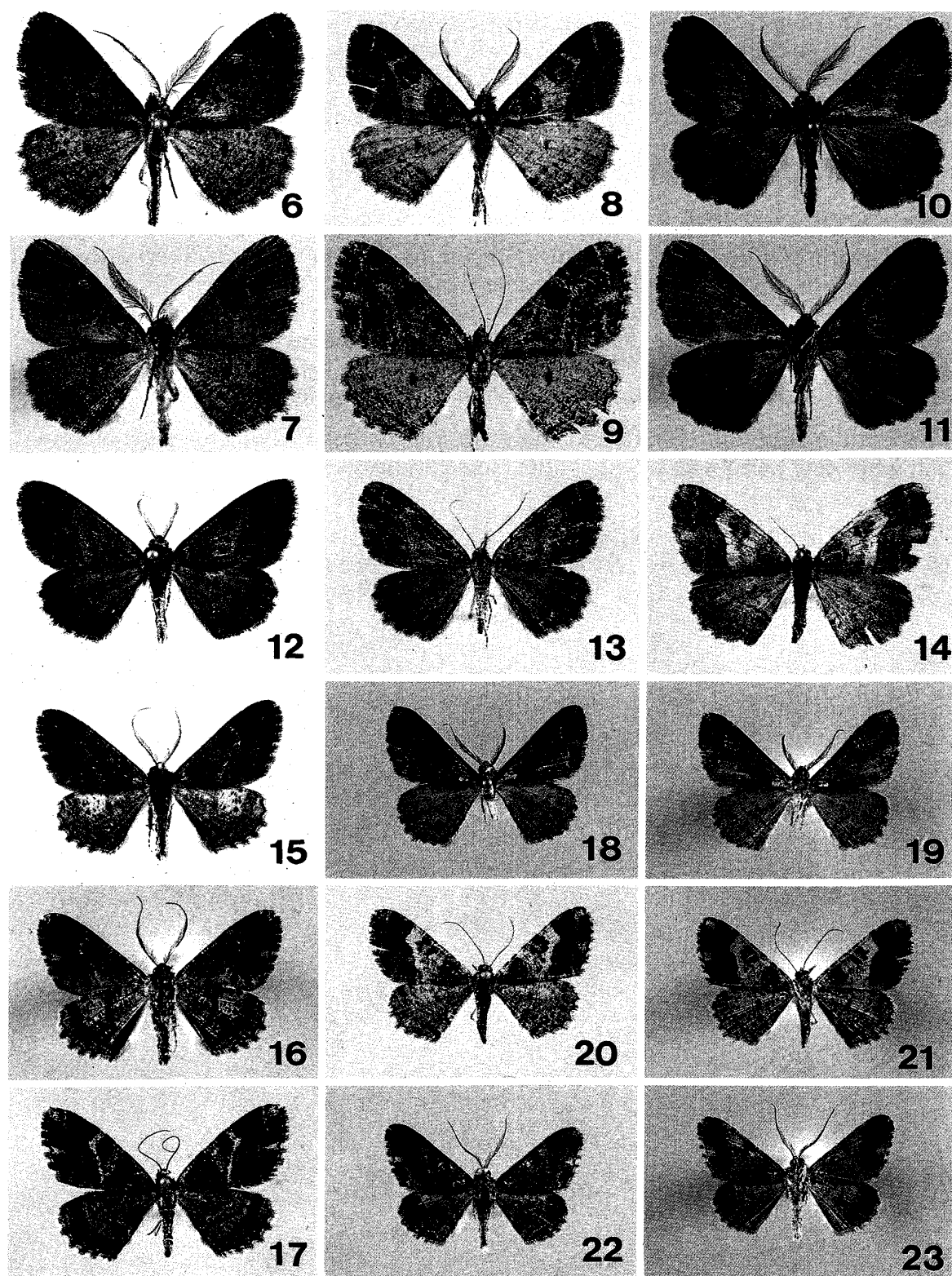
Length of forewing. ♂ 20-23 mm, ♀ 24-26 mm. Superficial appearance indicates this species is a typical member of the genus *Ectropis*. Similar to the congeners from the Philippines in appearance, but both wings generally darker with more clearly defined markings. In one of the male paratypes (Fig. 4) the brown band is developed along antemedial and postmedial lines. In spite of the ostensible similarity, this species can be easily distinguished from the other congeners by the male antennal structure. Male antenna bipectinate; two pairs of pectens in each segment equal in length, densely ciliate ventrally, unscaled dorsally, one pecten from the basal margin and the other near the distal margin of each segment; the longest pecten about four times as long as the length of the segment. In male, third abdominal sternite without cluster of spines; hind tibia without hair-pencil; forewing with a weak fovea; veins R_1 and R_2 stalked, arising from cell.

Male genitalia (Fig. 26). Similar to those of *E. schintlmeisteri* Sato. Valva more slender; juxta more sharply narrowed medially; vesica heavily scobinate at longer length apically with a longer stick-like cornutus.

Female genitalia (Fig. 27). Similar to those of *schintlmeisteri*, but distinguished by more slender colliculum.

Holotype. ♂, Philippines, Mindanao, Bukidnon, Mt Kitanglad, 4. i. 1995, NSMT. Paratypes. 5 ♂, same data as holotype, NSMT & RS; 1 ♂ 2 ♀, Mt Kitanglad S-Seite, Primärwald 1,700 m, 8°07'N, 124°55'E, viii. 1993, leg. V. Siniaev, ex A. Schintlmeister, ZFMK.

The male is atypical for *Ectropis* in having doubly bipectinate antenna, instead of fasciculate one, but the other characteristics quite agree with the typical *Ectropis*. The doubly bipectinate antenna characterizes the genus *Anectropis* which was erected for *Myrioblephara semifasciata* Bastelberger and its allies by Sato (1991). To the contrary two pairs of sensory hair-tufts on each segment have been considered as one of the most



Figs 6-23. *Alcis* spp. 6-9. *A. perplexa* sp. n. (6. ♂ ; 7. *Ditto*, underside ; 8. ♂ ; 9. ♀). 10-14. *A. mindanalis* sp. n. (10. ♂ ; 11. *Ditto*, underside ; 12. ♂ ; 13-14. ♀). 15-17. *A. kitangladensis* sp. n. (15. ♂ ; 16. *Ditto*, underside ; 17. ♀). 18-21. *A. antincta* sp. n. (18. ♂ ; 19. *Ditto*, underside ; 20. ♀ ; 21. *Ditto*, underside). 22-23. *A. subtincta* (Warren) (22. ♂ ; 23. *Ditto*, underside).

important characteristics to define the genus *Ectropis*. The antenna of this species could be understood as the most specialized state of "fasciculate antenna". Therefore there is no doubt to assign this species to *Ectropis*. The male and female genitalia of *schintlmeisteri* were shown in my previous paper (Sato, 1992).

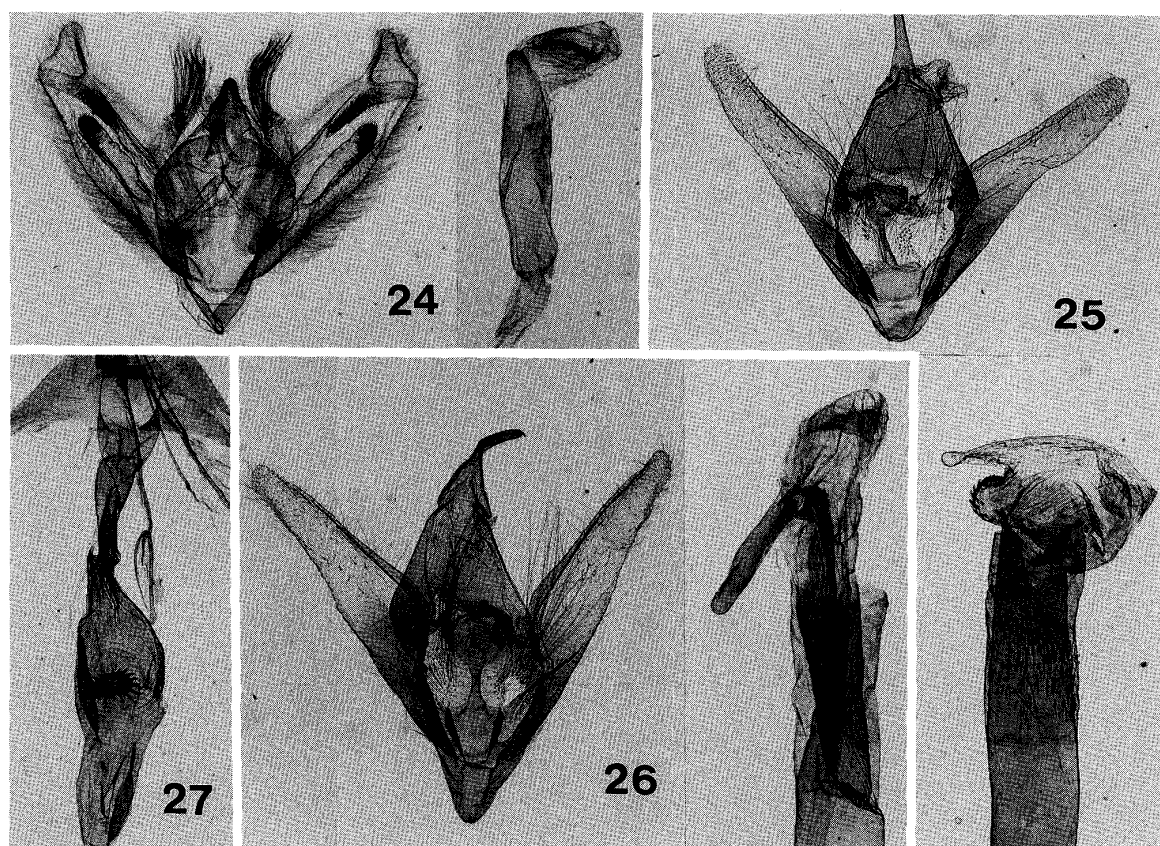
***Ectropis cernyi* sp. nov.** (Fig. 5)

Ectropis bhurmitra: Sato, 1992, *Tyô Ga* 43: 133 (part, nec Walker, 1860)

Male. Length of forewing 17–20 mm. Similar to *E. bhurmitra* (Walker) and *E. consentanea* Sato in appearance, but separable from them by the longer ciliation of male antenna. Both wings a little darker, tinged with brown. Cluster of spines on the third abdominal sternite and hair-pencil of hind tibia lacking as in *consentanea*, while in *bhurmitra* both are developed. Fowewing with a fovea; vein R_{1+2} arising from R_3 as in *consentanea*, while in *bhurmitra* it arises from cell. Female unknown.

Male genitalia (Fig. 25). Similar to those of *schintlmeisteri*, but apical scobination of vesica more developed with a longer stick-like cornutus and curled series of short spines besides.

Holotype. ♂, Philippines, Mindanao, Bukidnon, 45 km NW Maramag, Mt Binansilang 1,200 m, Bergurwald, 7°55' N, 124°40' E, 2. x. 1988, leg. K. Cerny & A. Schintlmeister, ZFMK. Paratypes. 1 ♂, same data as holotype, RS; 1 ♂, Bukidnon, 40 km NW

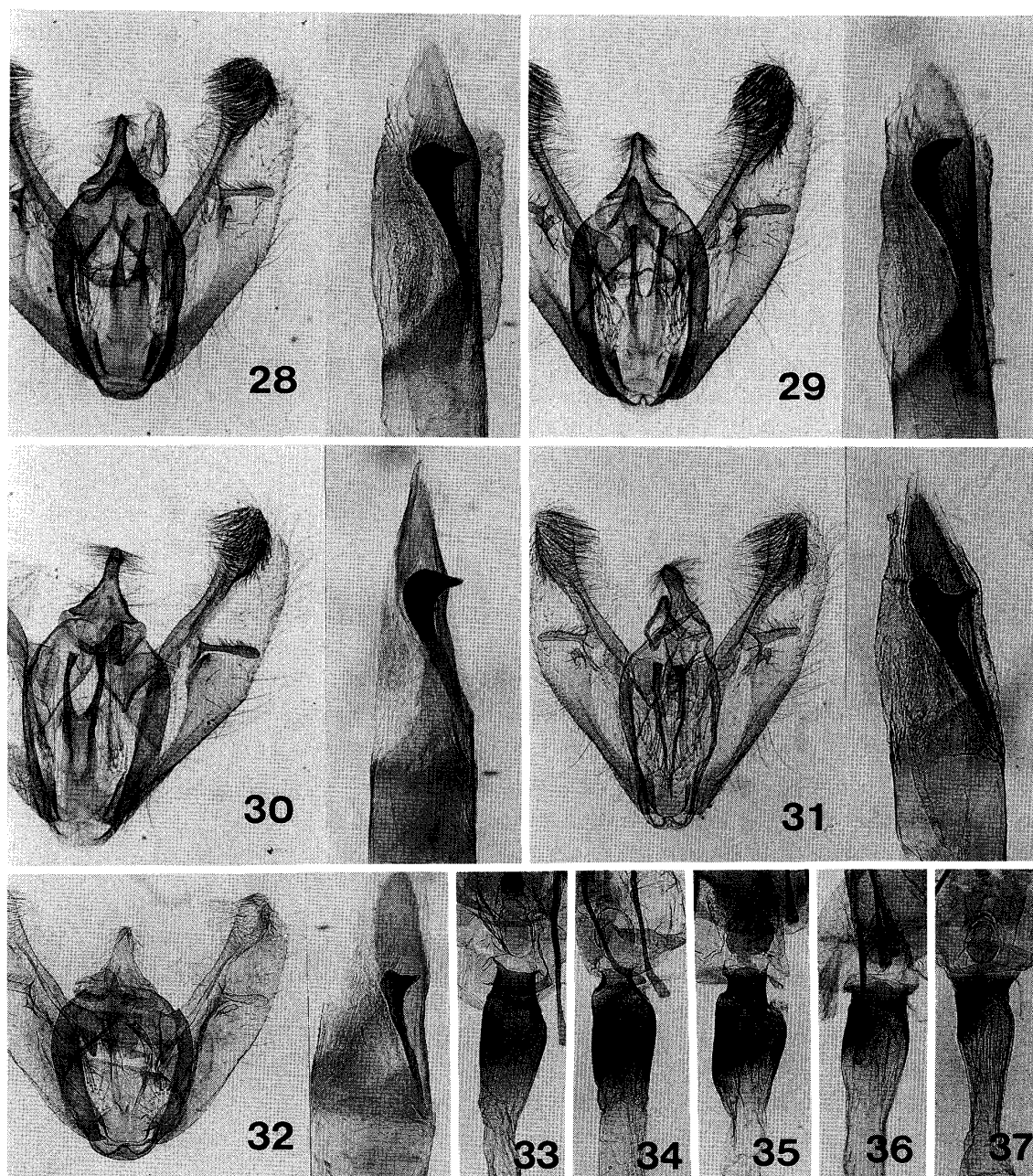


Figs 24–26. Male genitalia. 24. *Chorodna mindanensis* sp. n. RS-4162. 25. *Ectropis cernyi* sp. n. ZFMK. 26. *Ectropis pectinata* sp. n. RS-4445.
Fig. 27. Female genitalia of *Ectropis pectinata* sp. n. ZFMK.

Maramag, Dalongdong 800 m, Talakag, Waldrand, 7°53'N, 124°40'E, 1-3. x. 1988, leg. K. Cerny & A. Schintlmeister, ZFMK.

One of the paratypes from Mt Binansilang was recorded erroneously as *bhurmitra* by me (Sato, 1992: 133). Therefore, Mindanao should be deleted from the geographical range of *bhurmitra*.

I already recorded the following four species of *Ectropis* (Sato, 1992) from the Philippines: *E. bhurmitra* (Walker), *E. consentanea* Sato, *E. pais* Prout and *E. schintlmeisteri* Sato. *Consentanea* and *pais* are distributed in Mindanao, but the other two have



Figs 28-32. Male genitalia of *Alcis* spp. 28. *A. perplexa* sp. n. RS-4446. 29. *A. kitangladensis* sp. n. RS-4447. 30. *A. mindanalis* sp. n. RS-4492. 31. *A. subtinctoria* (Warren). RS-4488. 32. *A. antincta* sp. n. RS-4448.

Figs 33-37. Female genitalia of *Alcis* spp. 33. *A. perplexa* sp. n. RS-4487. 34. *A. kitangladensis* sp. n. RS-4486. 35. *A. mindanalis* sp. n. ZFMK. 36. *A. antincta* sp. n. ZFMK. 37. *A. subtinctoria* (Warren). RS-4093.

not been found there yet.

***Alcis perplexa* sp. nov.** (Figs 6-9)

Length of forewing. ♂ 17-18 mm, ♀ 17-20 mm. Male. Antennal pectens very long, the longest one about nine times as long as its basal segment; terminal one-fourth of antenna without pecten. Forewing: greyish brown, densely irrorated with fuscous black; lines black, obscure; antemedial line gently excurved; postmedial line right-angled beyond discocellular mark; submarginal line grey, undulating; discocellular mark represented by a short black streak. Hindwing: paler in colour than forewing with less defined maculation; antemedial line lacking; postmedial line represented only by spots on veins. Underside: both wings yellow-brown, variegated with fuscous irroration. In one of the paratypes (Fig. 8) forewing with yellowish area between well-defined antemedial and postmedial lines. Female. Wings paler in colour than male with similar maculation.

Male genitalia (Fig. 28). Indicating a close relationship to *A. variegata* (Moore) from India, but distinguished from it in the following characters. Valva broader; cucullus more dilated; a single cornutus more slender, especially tapered basally.

Female genitalia (Fig. 33). Similar to those of *variegata*, but posterior sclerotized part of bursa copulatrix shorter.

Holotype. ♂, Philippines, Mindanao, Bukidnon, Mt Kitanglad, 4. i. 1995, NSMT. Paratypes. 9 ♂ 1 ♀, same data as holotype, NSMT & RS; 7 ♂ 1 ♀, Mt Kitanglad S-Site, Primärwald 2,400 m, 8°07'N, 124°55' E, 4. viii. 1993; 1 ♂ 1 ♀, *ditto* 1,650 m, 5. viii. 1993, leg. V. Siniaev & A. Schintlmeister; 3 ♂, *ditto* 2,200 m, 1 ♂ 1 ♀, *ditto* 2,300 m, 19 ♂ 2 ♀, *ditto* 2,800 m, viii. 1993, leg. V. Siniaev, ex A. Schintlmeister, ZFMK & RS.

***Alcis kitangladensis* sp. nov.** (Figs 15-17)

Length of forewing. ♂ 16-18 mm, ♀ 17-19 mm. Similar to the preceding species, but a little smaller and darker in colour. Male. Antennal pectens shorter. Forewing: postmedial line less angled beyond discocellular streak; in some specimens lines well defined, medial yellowish area contrasting with the rest. Female. Forewing: postmedial line preceded by white shade.

Male genitalia (Fig. 29). Similar to those of *perplexa* sp. n. Cucullus narrower; cornutus more slender, not swollen but tapered distally.

Female genitalia (Fig. 34). Posterior sclerotized part of bursa copulatrix longer than in *perplexa* sp. n.

Holotype. ♂, Philippines, Mindanao, Bukidnon, Mt Kitanglad, 4. i. 1995, NSMT. Paratypes. 6 ♂ 1 ♀, same data as holotype, NSMT & RS; 1 ♂, Mt Kitanglad S-Seite, Primärwald 1,200 m, 8°07' N, 124°55' E, 5. viii. 1993; 2 ♂, *ditto* 1,700 m, 72 ♂ 9 ♀, *ditto* 2,200 m, 21 ♂ 4 ♀, *ditto* 2,300 m, 17 ♂ 2 ♀, *ditto* 2,800 m, viii. 1993, leg. V. Siniaev, ex A. Schintlmeister; 7 ♂, *ditto* 1,650 m, 5. viii. 1993, 23 ♂ 1 ♀, *ditto* 2,400 m, 4. viii, 1993, leg. V. Siniaev & A. Schintlmeister, ZFMK & RS.

***Alcis mindanalisis* sp. nov.** (Figs 10-14)

Length of forewing. ♂ ♀ 17-20 mm. Male. Antennal pectens long, the longest one about six times as long as its basal segment; terminal one-fourth of antenna without pecten. Forewing: reddish purple; antemedial and postmedial lines black, the former

irregularly outcurved and the latter weakly angled beyond discocellular streak ; submarginal line grey, undulated, weakly defined. Hindwing : almost uniformly grey with very weak discocellular streak and postmedial line. Underside : both wings dark grey with distinct discocellular black markings ; distal area a little darker than the rest ; termen tinged with yellow. In some specimens forewing paler as a whole with more defined markings and yellowish medial area. Female. Wings paler in colour than male with similar maculation.

Male genitalia (Fig. 30). Most similar to those of *kitangladensis* sp. n., especially in the shape of cornutus ; distal part of cornutus a little broader, less slender as a whole.

Female genitalia (Fig. 35). Posterior sclerotized part of bursa copulatrix as in *perplexa* sp. n.

Holotype. ♂, Philippines, Mindanao, Bukidnon, Mt Kitanglad, 4. i. 1995, NSMT. Paratypes. 1♂, same data as the holotype, NSMT ; 1♂, Mt Kitanglad S-Seite, Primärwald 1,650 m, 8°07'N, 124°55'E, 5. viii. 1993 ; 8♂, *ditto* 2,400 m, 4. viii. 1993, leg. V. Siniaev, ex A. Schintlmeister ; 4♂, *ditto* 1,700 m, 12♂ 3♀, *ditto* 2,200 m, 5♂, *ditto* 2,300 m, 9♂ 2♀, *ditto* 2,800 m, viii. 1993, leg. V. Siniaev & A. Schintlmeister, ZFMK & RS.

This species can be easily distinguished from the other congeners by reddish purple forewing and dark grey underside, though the male and female genitalia are very similar to them.

Alcis antincta sp. nov. (Figs 18-21)

Length of forewing. ♂♀ 14-16 mm. Similar to *kitangladensis* sp. n., but smaller in size. Very variable in colour and intensity of maculation individually, therefore sometimes almost impossible to distinguish this species from *kitangladensis* only by appearance. Also similar to *subtinca* (see below), but different from it in longer antennal pectens in male. Besides, underside of hindwing without black marking distally, while in *subtinca* the black band or marking is well developed.

Male genitalia (Fig. 32). Cornutus most similar to that of *perplexa* sp. n., but its pointed projection closer to distal end. Cucullus narrow as in *kitangladensis* sp. n. Valva shortest among the four congeners treated in this paper, including *subtinca*.

Female genitalia (Fig. 36). Similar to those of *subtinca*, but posterior sclerotized part of bursa copulatrix shorter, colliculum almost parallel-sided.

Holotype. ♂, Philippines, Mindanao, Bukidnon, Mt Kitanglad, 4. i. 1995, NSMT. Paratypes. 2♂, same data as holotype, NSMT & RS ; 29♂ 9♀, Mt Kitanglad S-Seite, Primärwald 1,700 m, 8°07'N, 124°55'E, viii. 1993, leg. V. Siniaev, ex A. Schintlmeister, ZFMK.

Poecialcis subtinca (Figs 22-23) was described from Luzon by Warren (1897 : 96). The male and female genitalia (Figs 31, 37) show it should be assigned to the genus *Alcis* (**comb. nov.**) and is a typical member of the *variegata* species group as well as the four new species described above. Colour and maculation are variable individually, and may also be geographically. I examined many specimens to be identified with *subtinca* from Mindanao as follows. They agree with *subtinca* from Luzon in the male and female genitalia, but show some differences in wing colour and maculation. Therefore, further study will be needed to confirm the taxonomic treatment of the population of Mindanao.

Specimens of *subtinca* examined from Mindanao : 9♂ 1♀, Bukidnon, 45 km NW Maramag, Mt Binansilang 1,200 m, Bergurwald, 2. x. 1988 ; 1♂ 1♀, Bukidnon, 40 km

NW Maramag, Dalongdong 800 m, Talakag, Waldrand, 1-3. x. 1988, leg. K. Cerny & A. Schintlmeister; 1 ♂ 4 ♀, Bukidnon, Mt Kitanglad S-Seite, Primärwald 1,700 m, 8°07'N, 124°55' E, viii. 1993, 1 ♀, *ditto* 750 m, viii. 1993, leg. V. Siniaev, *ex* A. Schintlmeister; 1 ♂ 4 ♀, Mt Apo W-Flanke 1,200 m, Sekundäewald, 6°57' N, 125°16' E, 28-30. vii. 1993, leg. V. Siniaev & A. Schintlmeister, ZFMK & RS; 1 ♀, Davao, Upper Baracatan, Apo Range, Mt Talomo 1,100 m, 17-19. viii. 1985, leg. M. Owada, NSMT.

In the Philippines, two more species, *Boarmia diadela* West, 1929: 121, and *Boarmia pissococoneta* West, 1929: 120, have been known from Luzon. They are closely related to the above new species from Mindanao and *subtincta*, and are typical members of the *variegata* species group from the view of the male and female genitalia. Therefore, *diadela* and *pissococoneta* should be placed in the genus *Alcis* (**comb. nov.**). The *variegata* complex will be revised in my later paper after examination of the material from the other regions than the Philippines.

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摘 要

ミンダナオ島産 *Boarmiini* (エダシャク亜科) 7 新種の記載 (佐藤力夫)

フィリピンのミンダナオ島から得られた標本を調べ、次の7新種を記載した。いずれもシャクガ科エダシャク亜科 *Boarmiini* 族の仲間であり、現時点で同島からのみ発見されている。

Chorodna mindanensis Sato

マレーからスンドラランドにかけて広く分布する *C. complicataria* (Walker) に近縁だが、やや小型で、後翅の外縁がより強く屈曲し、前翅の横脈紋がやや大きい。

Ectropis pectinata Sato

♂触角が両櫛歯状である点で、同属の他種と区別される。♂交尾器の形態は、ルソンから記載された *E. schintlmeisteri* Sato に近縁であることを示している。

Ectropis cernyi Sato

E. bhurmitra (Walker) と *E. consentanea* Sato に似るが、♂触角の繊毛はより長い。また♂後脚脛節の hair-pencil を欠く点は、*consentanea* と同様である。

Alcis perplexa Sato, *A. kitangladensis* Sato, *A. mindanalis* Sato, *A. antincta* Sato

以上4種は、いずれもインドから記載された *A. variegata* (Moore) に近縁で、交尾器の形態が互いによく似ており区別が難しい。むしろ外観の差異が同定に役立つ。今後インド・オーストラリア地域に分布する *variegata* グループに属する多くの種の分類学的再検討が必要である。

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